Pressure Injuries: Therapy – Antibiotics

Description/Etiology
Pressure injuries (PIs)—referred to as “pressure ulcers” until the change in terminology by the National Pressure Ulcer Advisory Panel (NPUAP, 2016) and also referred to as decubitus ulcers, pressure sores, or bedsores—are localized, oftentimes painful areas of damaged skin and/or underlying soft tissue resulting from prolonged or intense pressure or a combination of pressure and shear. The skin at the site of a PI can be intact or the injury can appear as an open ulcer. PIs usually occur over bony prominences or in areas where medical or other devices or surfaces exert prolonged pressure against the skin. Factors that can potentiate the injurious effects of pressure and shear include prolonged skin moisture, poor nutrition, and poor perfusion. The points of greatest pressure are the sacrum, heels, and occiput when the patient is supine and the ischial tuberosities when sitting. The epidermis does not show signs of necrosis until late in the hypoxic process because epidermal cells are able to withstand a prolonged absence of oxygen. For PIs to heal, an environment with minimal bacterial contamination is optimal. Standard treatment strategies include reducing pressure over bony prominences, irrigating the PI regularly, debriding of necrotic tissue, applying dressings, managing pain, maintaining good hygiene, and providing good nutrition. (For details about treatment, see Quick Lesson About … Pressure Injuries: Therapy -- an Overview).

Bacteria from skin and feces colonize PIs, but this does not indicate infection or the need for treatment. Strategies for preventing infection include identifying and minimizing factors that increase infection risk (for information, see Risk Factors, below). When infection develops, it can progress to severe bacterial invasion of tissue; infection can be localized or systemic and a severely infected PI can cause sepsis, myonecrosis, necrotizing fasciitis, gangrene, or osteomyelitis. The mortality rate is high in patients with sepsis.

In 2014, the NPUAP, the European Pressure Ulcer Advisory Panel, and the Pan Pacific Pressure Injury Alliance jointly issued updated guidelines regarding PI treatment. A major recommendation was to limit the use of topical antibiotics on PIs unless the benefit of treatment clearly outweighs the risk for adverse medication effects and antibiotic resistance. The guidelines indicate that topical silver sulfADIAZINE should be considered for use in heavily contaminated or infected PIs until definitive wound debridement is performed, and intensive patient monitoring for signs of medication toxicity or silver/sulfur sensitivity and allergy is important. Systemic antibiotics are recommended for patients who have clinical signs of systemic infection, including positive blood culture, cellulitis, fasciitis, osteomyelitis, or sepsis.

The National Institute for Health and Care Excellence (NICE) in the United Kingdom updated their clinical practice guidelines in 2014, recommending against the use of topical or systemic antibiotics in the routine treatment of PIs. NICE recommends administration of systemic antibiotics for adults with PIs if there is underlying osteomyelitis, clinical evidence of sepsis, or cellulitis that is spreading. NICE recommends against using systemic antibiotics specifically to heal a PI or based only on positive wound cultures in the absence of clinical signs of infection.

Systemic antibiotic regimens are individualized for each patient and are based on results of culture and sensitivity testing. Treatment can be monotherapy, combination therapy, or microorganism-specific.
Facts and Figures
Infection is the most common complication of PIs, and aerobic bacteria are the most common cause; common organisms include *Staphylococcus aureus*, Enterobacteriaceae (predominantly *Proteus* and *Escherichia coli*), coagulase-negative staphylococci, and *Enterococcus faecalis*. (For more information about common microorganisms that cause PI-related infection, see Quick Lesson About … Pressure Injuries: Complications ). Osteomyelitis occurs in 17–32% of patients with infected PIs. In cases of bacteremia, mortality can be as high as 50%.

Risk Factors
Risk factors for PI-related infection include poor health, immunocompromise, malnourishment, dehydration, and inadequate nursing care. The PI environment is susceptible to infection in the presence of trauma, a foreign object, poor hygiene, and wound ischemia. Bacterial colonization increases risk for PI infection.

Signs and Symptoms/Clinical Presentation
Signs of infection in a PI are extremely variable and systemic manifestations are not always present, especially in older adults. Signs and symptoms of local PI infection include erythema (i.e., redness), warmth, increased pain, edema and surrounding cellulitis, malodorous drainage, spontaneous wound bed bleeding, friable tissue, increased wound exudate, crepitus, necrosis, fasciitis, and regional lymphadenopathy. Systemic manifestations can include fever, chills, malaise, hypotension, increased heart rate, and changes in mental status. Osteomyelitis can manifest as fever, malaise, chronic fatigue, and limited range of motion in the affected limb.

Assessment
› Patient History
  • Assess risk for PI infection (see Risk Factors, above)
› Physical Findings
  • Assessment might identify previous or current PI sites, signs of localized or systemic infection, immobility and ADL limitations, poor health, comorbid conditions, poor nutritional status, and altered mental status
› Laboratory Tests
  • Leukocyte and erythrocyte sedimentation rate (ESR) elevation indicates infection
  • Albumin level < 3.5 mg/dL can indicate malnutrition
  • Blood culture results can indicate bacteremia or sepsis
  • Wound biopsy analysis for culture and antibiotic sensitivities can indicate severe tissue infection and identify effective antibiotics for treatment
  • Histologic analysis of bone tissue obtained from needle biopsy in patients with osteomyelitis is recommended to guide antibiotic therapy
› Other Diagnostic Tests/Studies
  • Imaging studies (e.g., X-ray, CT scan, MRI, radionuclide scintigraphy) can delineate the extent of deep-tissue infection and can show osteomyelitis; MRI has a 98% sensitivity and 89% specificity for osteomyelitis in patients with PIs

Treatment Goals
› Reduce Risk for or Promote Resolution of Infection
  • For information about treatment strategies unrelated to antimicrobial treatment, see the series of Quick Lessons about PIs
  • Monitor vital signs, assess all physiologic systems (especially skin, circulatory, and immune systems), and review laboratory/other diagnostic test results; immediately report abnormalities and provide prescribed treatment
  • Follow facility protocols for infection prevention during routine wound care
  • If ordered, apply a topical antibiotic (e.g., silver sulfadiazine) to the wound bed
    – Silver sulfadiazine should not be prescribed for patients with sensitivity to silver or sulfur
    – Monitor the patient closely for signs of sensitivity to silver sulfadiazine such as increased redness, burning, itching, or rash in the surrounding skin area
  • Administer prescribed systemic antibiotics for patients with clinical evidence of systemic infection; monitor for adverse drug reactions, toxicity, antibiotic resistance, and treatment effectiveness. Review a drug information resource for a complete list of adverse effects and complications
  • Request referral to an infectious disease clinician if one is not already part of the treatment team; involvement of this specialty clinician can improve outcome because first-line antimicrobials change rapidly
Support Emotional Well-Being and Educate Patient and Family Members

• Assess anxiety level and coping ability; provide emotional support, educate, and encourage discussion about PI infection, the necessity of performing PI biopsy for tissue cultures to determine appropriate antibiotic treatment, the importance of strict adherence to the prescribed treatment regimen, routine wound care, continued healthcare surveillance, and individualized prognosis. Request referral to a social worker, if appropriate, for identification of local resources for in-home services.

Food for Thought

• The current literature does not yet reflect the NPUAP’s recent change in terminology; it is expected that the term pressure injury will gradually replace pressure ulcer as acknowledgement of the change becomes widespread.

• The European Pressure Ulcer Advisory Panel (EPUAP) continues to support the guidelines issued in 2014 and has not yet adopted the new terminology and pressure ulcer classification system propounded by NPUAP in April 2016 (Markova, 2017).

PIs are moist, warm receptacles for bacterial contamination; for this reason, a culture obtained by swabbing the surface of a PI is unreliable.

Cochrane reviewers evaluated 12 small, clinically heterogeneous studies involving a total of 576 participants and were unable to find consistent evidence demonstrating the relative effects of topical or systemic antibiotics on PI healing (Norman et al., 2016).

Red Flags

• Signs and symptoms of PI-related infection (e.g., fever, chills) might be absent in older adults and in patients with chronically infected wounds.

• Patients with nonhealing PIs should be evaluated for osteomyelitis; if diagnosed, IV antibiotics are prescribed for 6–8 weeks and surgical resection of bone can be necessary.

• Bacteria can develop antibiotic resistance from injudicious antibiotic use; consider this if a PI-related infection does not resolve or worsens during treatment. Other potential adverse effects of antibiotic use are host toxicity (characterized by elevated liver enzymes, oliguria, and proteinuria), allergy (characterized by a rash, headache, nausea, vomiting, and dyspnea), and superinfection (i.e., overgrowth of drug-resistant microorganisms).

What Do I Need to Tell the Patient/Patient’s Family?

• PI healing can be a long process that requires family support and home care services; strict adherence to the prescribed treatment regimen is important, including frequent position changes, good hygiene, and good nutrition to promote infection resolution and PI healing.

• Seek immediate medical attention for new or worsening signs and symptoms.

References


